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Microbiota-based skin phenotypes in children with atopic dermatitis reflect a distinctive host response

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Atopic dermatitis, a prevalent skin disorder in children, is characterized by a dysregulated immune response and an altered skin microbiota. The disease displays high heterogeneity among patients and the exact role of the microbiota in disease development and severity is not yet understood. Moreover, high importance has been given to the bacterial skin composition, while skin fungi have received little attention in pediatric atopic dermatitis. This study aimed to unravel the interactions between the bacterial and fungal communities on the skin of children with atopic dermatitis and to identify their potential role in disease heterogeneity.

We investigated the bacterial and fungal microbiota composition on lesional and non-lesional skin sites of patients and on skin of healthy controls. We identified more correlations among the bacteria than the fungal genera during disease and leveraged this information to identify disease-specific subtypes. The three predicted subtypes (Cutotypes) differed not only in response to their bacterial and fungal composition, but also described different host immune responses. Two-week topical corticosteroid treatment altered both the microbiota composition and the host inflammatory response in a Cutotype-dependent manner. These findings suggest that the skin microbiota can be used to describe heterogeneity in atopic dermatitis and could be a future target for personalized disease management.